

# Stressors to Ecosystem Processes: Invasive Plants

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# Presentation Overview

- **Invasive Plants as Stressors**
- **Conservation Strategy (CS) Goals and Objectives**
- **Need for Management Plan**
- **Key Components of Plan**
- **SAFCA – Two sample projects**

# Invasive Plants as Stressors

- **Alter ecosystem processes**
  - **Nutrient cycling; fire dynamics, hydrology, geomorphic processes**
- **Habitat dominance & displacement of native species**
- **Hybridize with native species**
- **Promote non-native fauna**
- **Persistent in the absence of active management**

# Invasive Plants as Stressors - Examples



**Barbed goatgrass**  
Photo: Matt Wacker



**Water primrose**  
Photo: Julian Meisler



**Giant reed**  
Photo: John Goolsby

# Conservation Strategy Goals and Objectives

**Ecological Long-Term Goal 4. Reduce stressors related to the development and operation of the flood management system that negatively affect at-risk species. These stressors include loss and degradation of ecosystem functions and habitat because of invasive species, impairments to instream water quality and flows, isolation of floodplains from rivers by levees, and fish passage barriers.**

# Conservation Strategy Goals and Objectives

- **Indicator:**

**Invasive Plant-Dominated Vegetation—total area (acres):** measures reduction in the extent of these areas.

- **Objective:**

Reduce by some percent the area of vegetation dominated by invasive plants on DWR-managed land by integrating BMPs into maintenance practices and implementing invasive plant management actions.

# Need for Invasive Species Management Plan

- Describe DWR goals, objectives, and implementation actions for invasive plant management that tie back to CS objectives
  - Different way of looking at current DWR practices but not necessarily new practices
- Provide context and guidance for invasive plant management throughout the Systemwide Planning Area (SPA)
- Applies to DWR-managed lands but could be adopted by others



# Key Components of Plan

- **Statement of goals and objectives**
  - **What does DWR want and what will it do?**
- **Description of baseline conditions and data gaps**
  - **What do we know now and where do we need additional information?**
- **Identification of priority species**
  - **Species that adversely affect CS targets or that adversely affect the State Plan of Flood Control (SPFC) Operations & Maintenance (O & M)**



# Key Components of Plan

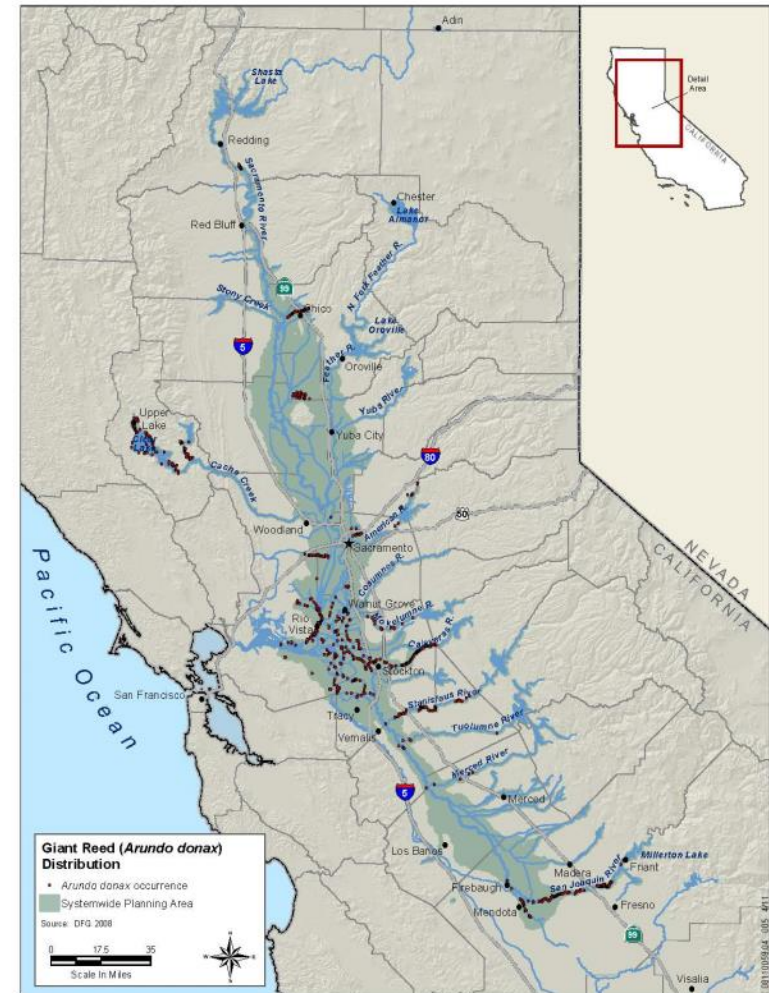
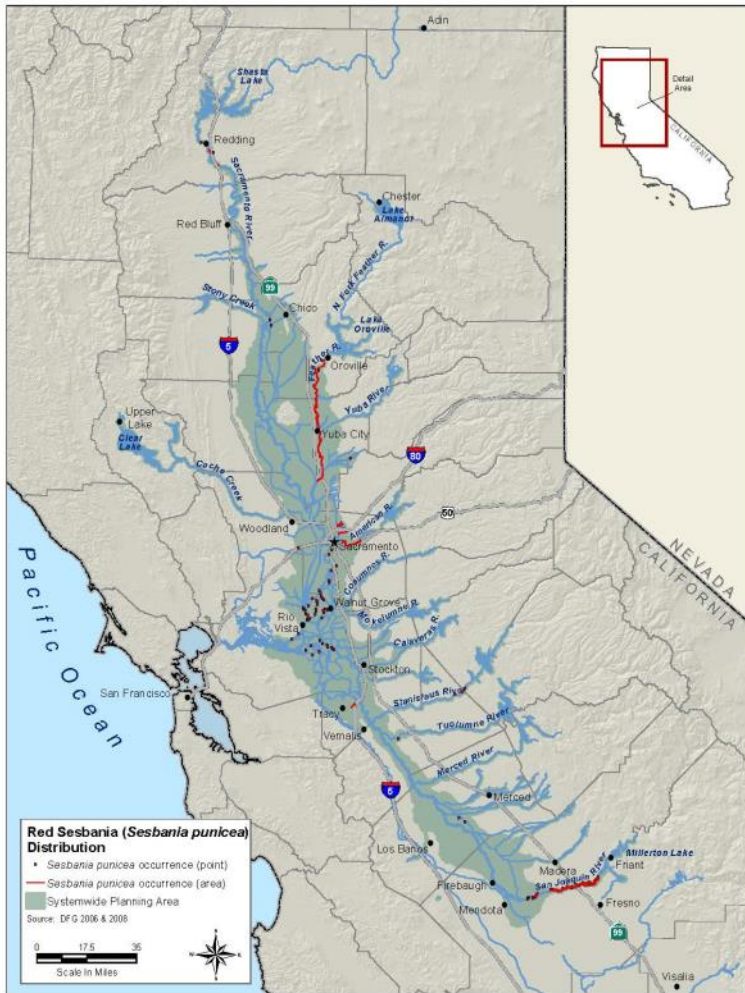
## Primary Species

- Tree of heaven, *Ailanthus altissima*
- Giant reed, *Arundo donax*
- Yellow star thistle, *Centaurea solstitialis*
- Brazilian waterweed, *Egeria densa*
- Blue gum, *Eucalyptus globulus*
- Edible fig, *Ficus carica*
- Perennial pepperweed, *Lepidium latifolium*
- Water primrose, *Ludwigia* spp.
- Purple loosestrife, *Lythrum salicaria*
- Crisp-leaved pondweed, *Potamogeton crispus*
- Himalayan blackberry, *Rubus armeniacus*
- Milk thistle, *Silybum marianum*
- Saltcedar, *Tamarix* spp.

## Secondary Species

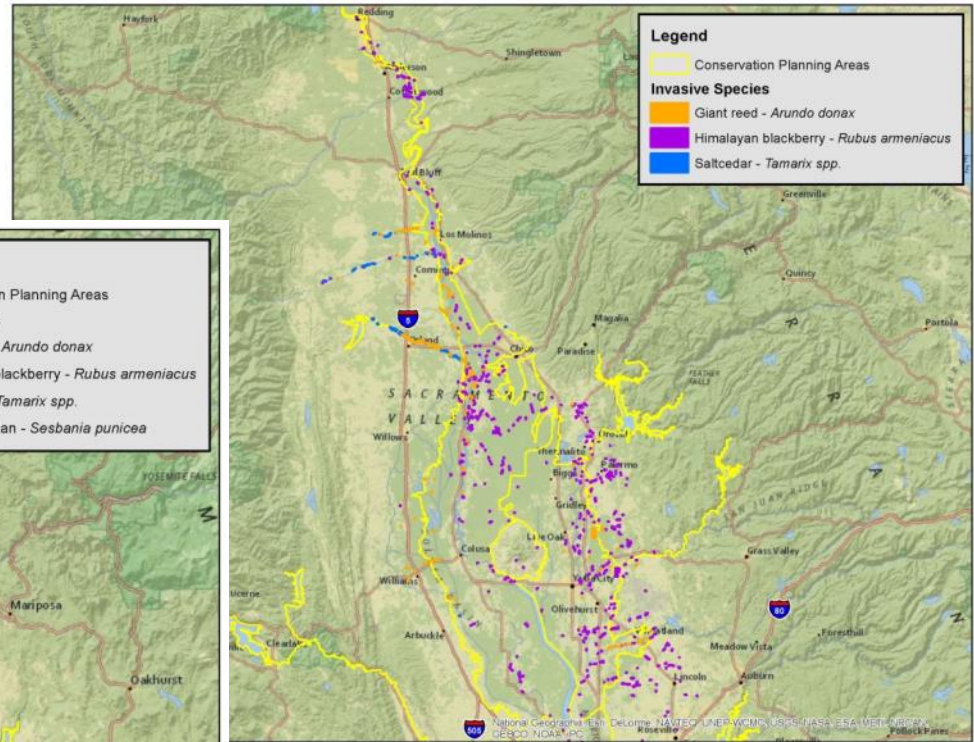
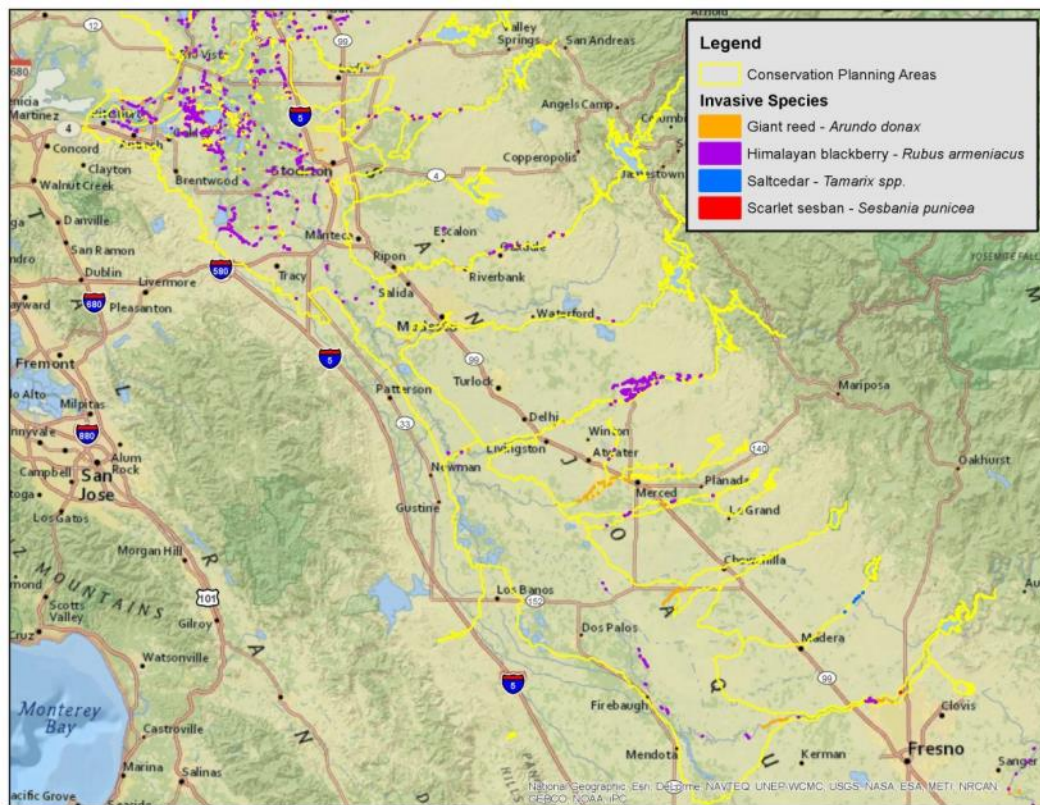
- Barbed goat grass, *Aegilops triuncialis*
- Alligator weed, *Alternanthera philoxeroides*
- Pampas grass, *Cortaderia selloana*
- Scotch broom, *Cytisus scoparius*
- Stinkwort, *Dittrichia graveolens*
- Medusa head, *Elymus caput-medusae*
- Fennel, *Foeniculum vulgare*
- French broom, *Genista monspessulana*
- Shortpod mustard, *Hirschfeldia incana*
- Hydrilla, *Hydrilla verticillata*
- American frogbit, *Limnobium spongia*
- Parrot's feather, *Myriophyllum aquaticum*
- Tree tobacco, *Nicotiana glauca*
- Scotch thistle, *Onopordum acanthium* ssp. *acanthium*
- Ravenna grass, *Saccharum ravennae*
- Russian thistle, *Salsola tragus*
- Red sesbania, *Sesbania punicea*
- Chinese tallowtree, *Triadica sebifera*

# Key Components of Plan





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# Key Components of Plan

- **Development of Treatment Prioritization Methods**
  - **How can available resources be maximized to produce the greatest net benefit to the CS?**

**Higher Priority**

**Lower Priority**



Adverse Habitat Effects  
Adverse Hydraulic Effects  
Adverse Geomorphic Effects  
Adverse SPFC Effects  
Limited Distribution  
High Probability of Spread  
High Site Integrity  
Low Probability of Re-infestation  
Potential for Collaboration  
Low Relative Habitat Value

Minimal Habitat Effects  
Minimal Hydraulic Effects  
Minimal Geomorphic Effects  
Minimal SPFC Effects  
Widespread Distribution  
Low Probability of Spread  
Low Site Integrity  
High Probability of Re-infestation  
Isolated Effort  
High Relative Habitat Value

# Key Components of Plan

- **Treatment Techniques and Best Management Practices**
  - Describe the full range of applicable treatment techniques – not just herbicides
  - Best management practices and permitting requirements for treatments
  - Targeted treatment recommendations for each species
  - Post-treatment habitat restoration recommendations

# Key Components of Plan

- **Monitoring, Adaptive Management, and Measures of Success**
  - Track and measure success
  - Determine if new approaches are needed
- **Tracking Progress**
  - Integration with overall CS tracking system
- **Regular updates**
  - Mapping treatment locations and infestations
  - Concurrent with CVFPP updates or as needed

# Two SAFCA Projects



Sacramento  
Area Flood  
Control  
Agency

- **Examples of large scale invasive plant management/displacement programs:**
  - **Red sesbania control program**
    - **Dry Creek Watershed & Lower American River;**
  - **Natomas Levee Improvement Program**
    - **Seeding of levee slopes, seepage berms & O & M areas;**
    - **Approx. 800 acres seeded/converted.**



# These example projects illustrate:

**Stressors to ecosystem processes.**

**How to reduce stressors related to the development and operation of the flood management system that negatively affect important species.**

**Seed Pods**



**Red Sesbania Origin: Argentina,  
Uruguay and southern Brazil**

# Removal/Control:

- **Benefits flood conveyance;**
  - Impediment to flow removed.
- **Benefits species;**
  - Anadromous fish: less bank erosion, less sediment in system.
  - Riparian vegetation; impedes recruitment, space to recolonize.
  - Toxic to wildlife (& Humans).
  - Changes to H2O quality unknown, but could be –ve?



# SAFCA Pumping Plant – Sesbania adversely affects flood conveyance





# Natomas East Main Drain Canal (NEMDC)/Steelhead Creek

Red Sesbania

# Robla Creek





# Robla Creek





# NATOMAS LEVEE IMPROVEMENT PROGRAM



**What we had to work with!**

**Engineers love perfectly uniform slopes!**



# NATOMAS LEVEE IMPROVEMENT PROGRAM

- Erosion control necessary – regulatory requirement ‘sod’ or ‘grass cover’;
- Swainsons hawk foraging habitat;
- Utilized CA native grass species to achieve objectives;
- All levees, seepage berms and O & M areas seeded;
- Replaced pre-project invasive plants occupying features/landscape;
- Implementation 2010-2013.



# Soil Preparation



**Chiseled/shallow  
ripped to create rooting  
depth.**

**D8 Cat or equivalent  
w/3 ripper shanks.  
Approx. 3 ft apart & 3 ft  
deep.**





## Soil Prep – Discing - create suitable seedbed



**Offset disc pulled by  
D6 cat. Disk clods  
down to < 4 inches  
in size.**





# Ridger Roller Seeder (RRS) – cost \$117,000





# Seeding Natomas Cross Canal (2010) Textured Slope & Emerging Seedlings

Ridger roller  
seeder (RRS)

Textured Seedbed w/RRS

Field Testing RRS





# Weed management problems

**March 2012**





# Maintenance – April 2013

Purple needle grass  
going to seed.  
Seeded in 2011



Woodland corridor  
'Interiors' also seeded  
w/natives.



TEWARDSHIP

ECONOMIC STABILITY





A photograph of a field of tall, green grass. In the background, a gravel path or road curves through the landscape. The grass is dense and appears to be a single species, forming a nearly pure stand.

**April 2013**  
**Nearly a pure stand**





**Waterside levee  
drainage swale,  
seeded Nov. 2012  
(no topsoil)**

**Photos: April 2013**



# Questions?

## Thank you!